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Iowa State University Center for Industrial Research and Service

IOWA STATE UNIVERSITY
Office of Economic Development and Industry Relations
College of Engineering

CIRAS NEWS

INSIDE
SPECIAL REPORT:
IOWA'S WORKFORCE SHORTAGE

VOLUME 51 | Number 1

AT A GLANCE

Grasshorse Technologies Inc., dba Grasshorse Studios

FOUNDED: 2002 in southern California; moved to Iowa in 2007

LOCATION: Winfield, Iowa

EMPLOYEES: 15

IMPACT: Business has roughly doubled over the past two years after CIRAS helped them find new life in government contracting.

OVERVIEW: Past clients include the Cartoon Network, Warner Brothers, Walt Disney Company, MTV, 2008 Olympic Games, and Union Pacific. Animation and design project work has included movie trailers for "The Maze Runner: The Scorch Trials" and "Hitman: Agent 47's homage to Mad Men," "Powerpuff Girls," "Star Wars: Clone Wars," and the Iowa Lottery.

LEARN MORE: grasshorse.com

Iowa Animation Firm Draws New Future for Itself—With Help from CIRAS and Government Contracts

It was supposed to be a boom time for Grasshorse Studios.

Kathy Buxton and her brother, Stephen Jennings, relocated Grasshorse, their television animation and visual effects business, from California to Iowa in 2007 to expand the company. Iowa's film industry was roaring, and the projects were lucrative, thanks to a generous state tax credit program for the film industry.

But it all changed drastically in a matter of months. First, the recession in 2008 led many potential clients to shelve projects. Then, a year later, Iowa's tax credit program imploded amid widespread allegations of fraud.

Grasshorse was one of many businesses caught in the crossfire.

"It practically destroyed us," said Buxton, producer and owner of the studio, now based in Winfield, Iowa. "We watched a million dollars in booked business go away overnight."

In November 2013, with the studio's future in jeopardy, Buxton reached out to the Henry/Louisa County Extension Office and the Southeast Iowa Small

Continued on page 2

On the Cover: Buxton and Jennings work on the title image for a mock public service announcement, "The Flare Virus Explained," which was included in 20th Century Fox's movie *Maze Runner: The Scorch Trials*.

CIRAS Mission: *Every day we will enhance the performance of industry through applied research, education, and technical assistance.*

CIRAS is supported in part by the DoC/NIST Manufacturing Extension Partnership, the DoD/DLA Procurement Technical Assistance Program, and the DoC/EDA University Center Program.

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Iowa Animation *continued from page 1*

Business Development Center. Both sent her to a CIRAS contracting specialist.

"Two people in one week told me I needed to talk to Beth White," Buxton said. "She called me, and we set up a meeting."

By then, Buxton said, "we really were in a spot." Grasshorse's long list of clients previously had included Disney, Warner Brothers, Cartoon Network, and Leo Burnett. But by the end of 2013, the company had been through three sales people, and "it hadn't really worked" to gain business, Buxton said.

"It was a miracle that CIRAS contacted us."

White said she started by helping Grasshorse find new markets, "since the commercial market in Iowa was very competitive and there were not as many opportunities."

Business soon began to rebound, Buxton said, as CIRAS helped her find new opportunities and ways to market the family-owned company outside Iowa. Through it all, Buxton has been eager to learn.

"I've done a lot of webinars and workshops, [but] the strongest, most effective thing is when she comes and we sit and talk," she said. "Beth has spent significant amounts of time with me, teaching me how to set up things.

"It's more than the contracts… It's how she's opened our mind to how to go about business and marketing."

CIRAS' role has included helping Grasshorse with finding potential business opportunities in the government sector; with market research on competitors and target agencies at the federal, state, and local levels; and with understanding and providing a plan for marketing.

"Grasshorse was able to quickly identify some projects for municipalities in Iowa for their capabilities and received the contracts and completed the work satisfactorily," White said. "Soon after, they began working with the city of Tulsa's Stormwater Quality Department on a complete public service-type campaign, exactly in their wheelhouse."

Grasshorse spent four months developing characters and a story line and producing animated shorts for use by the city of Tulsa, Oklahoma. A five-year contract with Tulsa eventually brought the company $50,000 annually—and numerous awards. The public service announcements earned three gold awards for Grasshorse in regional Cedar Rapids-Iowa City American Advertising Awards

Above: Civilian, Mingo the Fish, and Sergeant Red—all characters Grasshorse created and animated for the "Painted Turtle" public service announcement for Tulsa Stormwater.

competition and several awards of excellence from the Iowa Motion Picture Association.

"This project turned into much more," White said. It "has opened up doors that they may not have had previously, or even thought about."

The list of Grasshorse clients now includes the city of Cedar Rapids, the Louisa County Community Foundation, 20th Century Fox, and the Iowa Lottery. The company currently is looking at rebranding its stormwater PSAs to market to other agencies such as the Natural Resources Conservation Service or the Environmental Protection Agency.

Buxton said she enjoys the company's new role.

"Our father worked with the government in one form or another most of his life," she said. "It's really an area that we wanted to get into; we just didn't know how to do it."

Government projects have given the studio enough work, Buxton said, to get the staff and crew "to the point where they have the skills to do better work so we can get better jobs. It's not just bringing money in the door, it's what level of quality you bring to the table."

Business now has doubled since Grasshorse had its first meeting with CIRAS nearly two years ago.

Before the Iowa film industry collapsed, the company had 25 employees. Today, there are 15.

"But I think we've progressed in the quality of the business and how we do business," Buxton said. "We're doing work now that we couldn't have done then."

The company's goal is to contract for repeat business—adding job stability for the employees, so Buxton isn't always on the hunt for new clients and can concentrate on other ways Grasshorse can grow. Simultaneously, Grasshorse is seeking to expand geographically.

"We're trying to brand ourselves as regional midwestern," she explained. "You have to find people who have a need for regional to national to international, and typically that's not in Iowa, where our clients come from."

CIRAS helped her with the approach by pointing out the benefits of partnering.

"They really helped me in figuring that out," Buxton said. "I went to a daylong workshop in Cedar Rapids last year and [the facilitator] talked about how to pair up small businesses with other small businesses. They showed me how to go about making that happen."

White said Grasshorse's leaders are "consistent and persistent, and take this market as seriously as their other clients, which is why they have found such success."

Animated title and end cards from "The Flare Virus Explained" for 20th Century Fox's feature film "Maze Runner: The Scorch Trials."

For more information, contact Beth White at whiteb@iastate.edu or 563-370-2166.

Consortium Hopes Better Packaging Will Help Companies Cut Costs, Increase Sales, Improve Sustainability

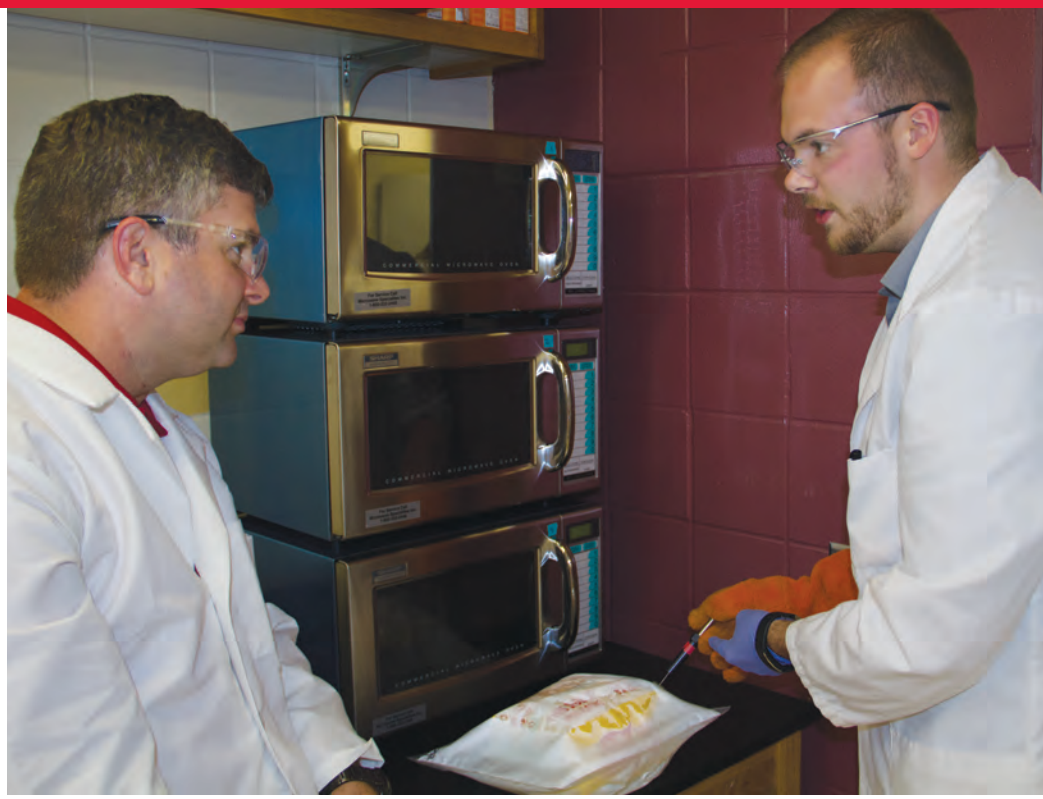
Keith Vorst doesn't think outside the box so much as he thinks about the box—and how it affects everything around it.

Vorst, an associate professor in Iowa State University's Department of Food Science and Human Nutrition, also is director of the university's new Polymer and Food Protection Consortium. He has spent the last year working to build a national center for packaging research and expertise—a place where companies in Iowa and elsewhere can go to assess the design, safety, function, and value of the packaging that envelops their products.

"We're trying to be a packaging clearinghouse for industry," Vorst said. "Basically, if it's packaging and recycling and food safety- or quality-related, then Iowa State needs to have a hand in that conversation when industry makes its decisions."

Packaging is a major expense for many businesses. A 2013 Smithers Pira study projected that the global packaging market will top $975 billion by 2018. Nearly $284 billion of that money will be spent by food businesses, who face challenges both from ever-changing government regulations and from growing consumer expectations regarding safety and sustainability.

Yet most companies don't have in-house expertise to explore alternatives.



Dr. Vorst and graduate student Nathan Davis evaluate the performance and safety of microwave popcorn.

"A lot of companies don't revisit their packaging often enough," Vorst said. "They'll come up with a design, put it into production, and the same design becomes part of their standard operating procedure for years. In many cases, those designs are due for refinement."

Enter the consortium, which is part of Iowa State's College of Human Sciences and the College of Agriculture and Life Sciences.

Vorst has established a multidisciplinary, centralized hub for companies and state regulators to receive independent reviews of packaging. Before the consortium, Iowa companies had access to data only from their suppliers or universities in other states. Now, for an annual membership fee, companies can access a hub of research and expertise.

The consortium's members, currently 10 companies, choose up to five large research projects to complete each year for the benefit of all members. Members also have access to reserved open lab time for smaller, company-specific packaging research projects.

One Iowa business that already has benefited from the consortium is American Pop Corn Company. The company has been exploring new cost-effective and healthy ingredient solutions for its products and new performance criteria for its packaging. Mike Carr, director of quality assurance and product development, describes microwave popcorn as a nearly $1 billion industry, with the "product package just as important as the microwave in providing piping hot, delicious microwave popcorn snacks."

American Pop Corn Company and one of its packaging suppliers, Coveris, found the consortium with help from CIRAS. Carr said the company's available technical resources for packaging research "were far outmatched by the researchers within the consortium. Joining the consortium gave us the

For more information, contact Brenda Martin at bkmartin@iastate.edu or 515-570-5282.

agility and depth of resources needed to find answers."

Vorst's team recently conducted research to validate the safety and seek ways to improve the performance of microwaveable popcorn packaging. Vorst will soon be sharing the results with consortium companies.

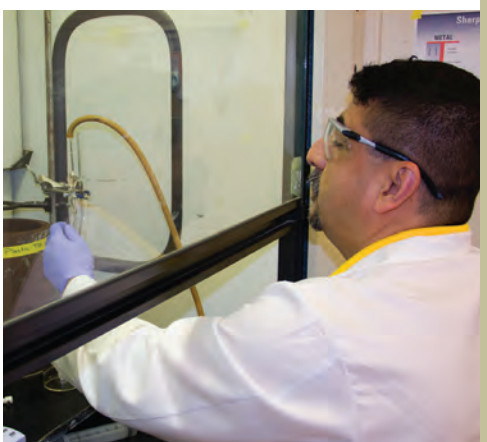
American Pop Corn Company officials say it's too early to discuss the economic implications of that research. But Tom Elsen, vice president of marketing, acknowledged that there would be a "tremendous competitive advantage" to finding packaging and alternative ingredients that create an environmentally friendly and healthier product for consumers.

While the consortium's research focuses on food packaging, it has capabilities to serve other sectors, such as the automotive industry. "We can be an advocate for both the consumer and the company when we meet with regulatory agencies," Vorst said. "We serve both interests."

Vorst also presented at a CIRAS Packaging Short Course in October, giving companies an opportunity to work hands-on with design, simulation, and testing technology in the packaging consortium's labs.

Vorst's goal is to grow the consortium to 20 members within the next year. Membership applications are currently being accepted.

Dr. De León Mendoza evaluates recycled plastic food packaging for quality and performance.



CIRAS Helps American Pop Corn Company Overcome Industry Challenges

The maker of JOLLY TIME® Pop Corn turned 100 last year, but with eyes focused as much on the future as on the past.

American Pop Corn Company has been working with CIRAS project manager Brenda Martin (and others) to maintain its competitive position in a $1 billion snack category that's seen steady annual declines of 5 percent to 6 percent in recent years.

The results are not yet in, said vice president of marketing Tom Elsen. But overall, "CIRAS has heightened our emphasis on innovation and worked with us to … help us do a better job identifying new opportunities within the marketplace and within our company."

CIRAS has helped by hosting a blind taste-testing panel at Iowa State. CIRAS' work on the innovation process prompted quick and efficient decisions by the company to move forward with specific new product ideas while dropping others that were deemed not viable.

"We needed a process in place that was much more scientific and forced us to ask better questions early," said Elsen.

> "We needed a process in place that was much more scientific and forced us to ask better questions early."
> *— Tom Elsen*

Greg Hoffman, vice president of production, said CIRAS' innovation assistance saved the company time and money and introduced a more open-minded approach: "We are looking at things we never would have considered before."

American Pop Corn Company recently started two other projects through CIRAS. One will use a multidisciplinary team at Iowa State to identify the company's largest production inefficiencies and propose solutions. The other involves establishing processes to facilitate review and analysis of consumer feedback about new products.

Combined, the company said its projects have the potential to increase sales and create millions of dollars in savings.

CIRAS Manufacturing Leadership Program Helps Companies Find their Next Generation

CIRAS' first Manufacturing Leadership Program was broad, educational, and useful, according to the newly graduated Martina Bockenstedt, general manager for FarmTek and Growers Supply.

"It offered everything from finance and marketing to more of the leadership skills," she said. "I could glean something from every one of them."

Bockenstedt was one of 15 participants from companies around Iowa who visited Ames in August for the successful weeklong event. Morning classes focused on the fundamentals of managing a manufacturing business. Afternoon sessions focused on leadership skills, such as the best way to communicate and motivate employees.

The curriculum was based on the challenges faced by managers as they move up through their careers, said CIRAS program director Mike O'Donnell. Newly minted leaders can still lean on their bosses for advice and support after their first promotions into supervisory roles. But specific skills are required to operate at the top tier of a company.

> "It offered everything from finance and marketing to more of the leadership skills. I could glean something from every one of them."
> — *Martina Bockenstedt*

"One of the things that we've noticed over the years is that small to mid-size manufacturers often struggle with the middle-to-upper management transition," O'Donnell said.

With participants ranging from front-line managers to company vice presidents, it was important that sessions include a variety of perspectives, O'Donnell said. In addition to five CIRAS staff members, four Iowa State University faculty and four consultants led classes throughout the week.

"There are a lot of people involved in this. It's not just one or two people coming in and trying to teach everything," O'Donnell said.

For Bockenstedt, classes provided both practical advice and an opportunity for discussion with other leaders. "It really made it manageable and broke it down to a point that you could utilize the information on a day-to-day basis," she said.

Jack Ward, program manager for Quatro Composites, heads a team that works on various projects throughout the company. Ward found meaningful lessons in each class, as well as ideas for implementing those lessons into his job.

Managers must understand how their outlook affects other employees, Ward said. Leaders "help shape/define the culture, vision, branding, and path to success of our businesses—by design and sometimes unintentionally."

The goal of the program was to take managers beyond the nuts and bolts of their businesses, O'Donnell said—to offer support and ideas to help them communicate with and motivate employees.

"What's really, really important is being able to lead. An effective leader knows what he or she knows and doesn't know about parts of the business" and is willing to learn from peers, he said.

Details for the 2016 program will be announced shortly.

For more information, e-mail Mike O'Donnell at modonnll@iastate.edu or call 515-294-1588.

Iowa STEM-related Outreach Expanding; STEM Job Creation Trails National Average

Attention anyone who wants to get involved in advocating science, technology, engineering, and math careers to promising young minds: there will soon be many more opportunities to volunteer.

Programs in Iowa State University's College of Engineering to promote STEM fields to elementary and middle school students are growing rapidly—and about to kick things into an even higher gear.

Over the summer, John Deere agreed to donate $120,000 toward the launch of 150 new teams in Junior FIRST LEGO League— more than doubling the number of available slots for builders ages 6 to 9.

Advocates see the LEGO leagues and other programs as a valuable opportunity to seed Iowa's talent pool and expand it for vital future jobs.

Iowa State economist Liesl Eathington said Iowa, at 4.8 percent, currently ranks 39th in the United States in its percentage of jobs linked to STEM occupations. Those jobs account for 6.2 percent of all workers nationally.

Iowans who work in STEM are less likely than the country as a whole to work in manufacturing, information, the government, or "professional, scientific and technical services." They're slightly more likely to work in finance, insurance, or real estate.

Yet, young Iowans who seek out STEM jobs aren't at a salary disadvantage—at least not initially. Eathington's analysis found that Iowa slightly exceeds U.S. pay levels for the lowest-paid 10 percent of STEM jobs, meaning "Iowa may be better able to compete for early-career workers than for mid- and late-career workers."

Right now, competition for the hearts and minds of middle schoolers appears to be going well.

Iowa's FIRST LEGO League—the league targeted for students ages 9 to 14—has seen participation jump from 104 teams in 2007 to 457 teams in 2014. Iowa also has seen sharp increases in the number of teachers involved with Project Lead the Way, a school curriculum promoting STEM skills in schools.

"All of our programs are growing pretty substantially," said Camille Sloan Schroeder, the director of K–12 outreach for Iowa State's College of Engineering. "A long time ago, it used to be that colleges just targeted high schoolers. Now, research is telling us we have to get the kids interested (in STEM) earlier, and help build their self-efficacy around math and science for building positive opinions of their own performance.

"It's human nature," Schroeder said. "We don't like to do things we don't think we're good at."

FIRST LEGO League participants work in teams to complete themed research projects and solve tasks on a playing field using LEGO Mindstorm robotic kits. (It all culminates each January at the Iowa Championship on the Iowa State University campus.) Jr.FLL participants have a season going into late spring, with a similar challenge theme.

The goal with both programs is to encourage and reward an interest in STEM thinking well before Iowa students hit high school. "We feel that's the age range of kids that we really need to get going," Schroeder said. "They're young and they're eager to learn."

For more information about FIRST LEGO League and other STEM programs directed by the Iowa State College of Engineering, visit www.isek.iastate.edu or e-mail isek@iastate.edu. You can find a complete list of other Iowa State University STEM offerings at www.ispy.iastate.edu.

Wind Simulation and Testing Laboratory (WiST Lab)

The WiST Lab is a world-class, state-of-the-art experimental facility for conducting research, education, consulting, and outreach in the subject area of wind-structure interaction. It is a one-of-a-kind facility for applications in wind engineering, aeronautics, and industrial aerodynamics.

Example Uses

- Effects of ground roughness on the formation, breakdown, and dissipation of vortices
- Interactions of structures in high winds
- Landing and take-off characteristics of aircraft
- Effects of wind on plant stress and soil erosion
- Aerodynamic performance of cars, sails, and sportswear
- Designing wind turbine units for optimum performance
- Impact of wind on long-span bridges, tall buildings, and other flexible structures
- Improving quality and reliability of products in high-wind environments
- Reducing damaging effects of wind on built structures
- Wind loads on light poles, power conductors, and solar panels

For more information, contact
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CIRAS Helps Cline Tool Assess and Enhance Safety Procedures and OSHA Compliance

Sometimes, you just want to know.

Cline Tool, based in Newton, recently completed a 15-month project with CIRAS to evaluate its safety plans and procedures. The result? Cline now has a new Safety Committee to address safety procedures, processes, and compliance moving forward. And its Board of Directors is much more confident after being reassured that Cline has a strong program in place that meets OSHA requirements.

Jason Benson, Cline Tool's chief financial officer, said the company turned to CIRAS to "get a realistic view of where we're at with our safety program."

Jim Poe, CIRAS project manager, said the goal of safety transformation planning is to guide companies through a maze of regulations and "to help manufacturers provide a safe working environment for their associates."

Poe started the process by walking through Cline Tool's manufacturing plant and making assessments through the eyes of an OSHA inspector. "He saw where we might have challenges to overcome, which laid out the framework for our sessions," Benson said.

The 12-session program involves assessing current conditions, document practices, emergency action plans, job hazards, and trainings. Poe also reviews topics such as storage of flammable liquids, machine guarding, electrical safety, indoor air quality, and other items specific to the location. Companies move through the program at their own pace, usually over a period of 12 to 18 months.

> "Jim helped us to break the work down into manageable pieces. He gave us relevant federal guidelines to follow and how that translates into real-world documentation and processes."
>
> — *Jason Benson*

"Jim helped us to break the work down into manageable pieces," Benson said. "He gave us relevant federal guidelines to follow and how that translates into real-world documentation and processes."

As a result, the company has initiated regular safety walks by Safety Committee members to identify and resolve potential issues, completed Job Hazard Analysis documents for all shop positions, and refined its lock-out/tag-out procedures. Cline also started a new safety training process for new hires, created an annual safety training schedule for existing employees, and added eye-wash stations throughout the shop area.

"We all felt like we had a safe shop … but we realized just how many areas could use some improvement," Benson said. CIRAS was flexible and anxious to share its knowledge, he added.

"Any manufacturer could find a lot of value in a program like this."

AT A GLANCE

Cline Tool

FOUNDED: 1948

LOCATION: Newton, Iowa

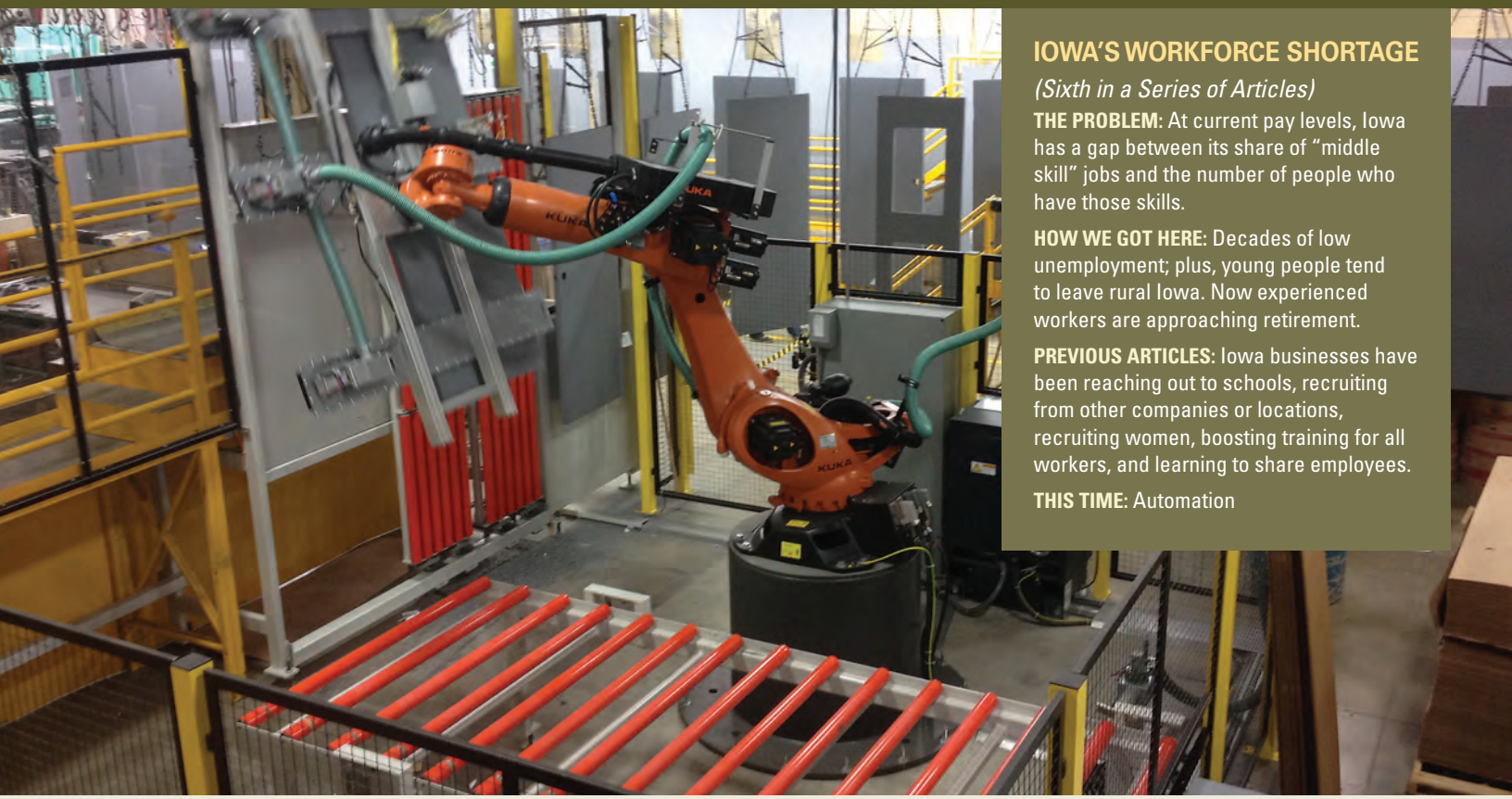
EMPLOYEES: 75 in Iowa; 90 nationwide

IMPACT: A new Safety Committee was initiated to address safety procedures, processes, and OSHA requirements, and the company refined and improved several safety procedures and training processes.

OVERVIEW: Cline Tool designs and manufactures custom metal cutting tools for many industries including agriculture, construction equipment, automotive, appliances, and hydraulic valve control.

For more information, contact Jim Poe at jrpoe@iastate.edu or 515-290-1398.

Cline Tool's high-tech manufacturing equipment includes a DMG MORI SEIKI machine cell.



IOWA'S WORKFORCE SHORTAGE

(Sixth in a Series of Articles)

THE PROBLEM: At current pay levels, Iowa has a gap between its share of "middle skill" jobs and the number of people who have those skills.

HOW WE GOT HERE: Decades of low unemployment; plus, young people tend to leave rural Iowa. Now experienced workers are approaching retirement.

PREVIOUS ARTICLES: Iowa businesses have been reaching out to schools, recruiting from other companies or locations, recruiting women, boosting training for all workers, and learning to share employees.

THIS TIME: Automation

If They Won't Come, Build It—With a Robot

The evolution of manufacturing is occurring bit by bit across Iowa—including, among other places, at a metal door factory in Mason City.

Curries, part of the Sweden-based ASSA ABLOY Group, is where roughly 490 production workers go each day to produce steel doors and frames.Since 2012, the company has been working steadily to automate the final phase of its door-handling process—a manual labor-intense procedure that tends to spawn high turnover and can cause the kind of muscle injuries that are common in an aging workforce.

The first phase was installing machines to lift doors off the assembly line and lay them flat. This past spring, a new automated system was put in place to begin packaging the doors. David Bill, Curries' engineering manager, said the company now is evaluating a third phase with "the potential to eliminate the manual movement of these doors." If adopted, the new machines would free up additional employees who could be reassigned to work in other parts of the plant.

"I think that's our strategy—at least as far as being located in Mason City and having the labor market that exists here," Bill said. "That's what we're going to have to do to keep building the same volume in Mason City with the workforce that we have."

Companies across Iowa have turned to various forms of automation as one way to deal with an inability to find skilled workers at what the companies consider to be a practical wage. The idea is to feed potential growth by freeing up as many current workers as possible and moving them to something more important.

"We don't look at automation as a way of reducing head count," said CIRAS industrial specialist Chris Hill. "We

AT A GLANCE

Acieta
LOCATION: Council Bluffs
FOUNDED: 1983
EMPLOYEES: 120
WHAT THEY DO: Integrate automation systems for companies in all industry sectors
AUTOMATION: Installed more than 4,000 robotic systems in companies across North America

Advanced Machining & Automation Inc.
LOCATION: Mount Pleasant
FOUNDED: 1998
EMPLOYEES: 12
WHAT THEY DO: Design, manufacture, and install automated machinery for a multitude of industries in the United States, Canada, Mexico, and Europe
AUTOMATION: Promise "a turn-key solution that will bring the most value to your organization"

Curries
LOCATION: Mason City
FOUNDED: 1957
EMPLOYEES: 650 (425 in production)
WHAT THEY DO: Steel doors and door frames
AUTOMATION: Used to grind down welds on metal doors and to handle door packaging. Twenty robots now in facility; five more expected by roughly the end of 2015.

Polo Custom Products
LOCATION: Monticello
FOUNDED: 1947
EMPLOYEES: 125
WHAT THEY DO: Custom industrial sewing, RF welding, and thermoforming for several OEM markets, including medical, fire and safety, military, and industrial
AUTOMATION: Recently automated the process of cutting first-aid discs for a military contract

Tecton Industries
LOCATION: Spencer
FOUNDED: 1981
EMPLOYEES: 47
WHAT THEY DO: A leading producer of precision machined components, including CNC turning, machining, and assembly services
AUTOMATION: From the beginning, a strong advocate of pursuing the best technology to let employees "work smarter, not harder"

look at it as a way of better utilizing the labor force you have now to maximize profitability for the company. We want everybody working in the highest value-added areas."

"We look at it as a way of better utilizing the labor force you have now to maximize profitability for the company. We want everybody working in the highest value-added areas."
— Chris Hill

Burton Mills, president of Advanced Machining & Automation Inc., a Mount Pleasant provider of automation equipment, said most companies come to him "because either their cost structure has to be cheaper for some reason or they think they've exhausted their available people, and they're stuck. Maybe they'll be able to add one or two more, but they won't be able to add the 20 that they would need to launch something new."

Automation covers a broad spectrum of possibilities, Hill advises—from simple fixtures that can make it easier to repeatedly and reliably drill the same hole at the same place to a totally integrated system in which machines are linked electronically from the time an order is taken to the time the product is routed to a truck. One size does not fit all.

Many companies may find increased productivity by automating repetitive or physically demanding tasks that cause problems for workers. "Anymore, people don't seem to want to do the repetitive stuff," said Ken Eagleburger, a plant engineer at Polo Custom Products in Monticello. "So they don't seem to want to stay long."

At the same time, technology has made automation cheaper and more accessible than ever, experts say. Factor in things such as a reduced need for worker training, and the machines get even easier to justify.

John Burg, division president at Acieta in Council Bluffs, said business during his 30-year career in building automation systems has expanded from roughly five projects per year to the current "more like ten a month."

"That's growing," Burg said. The automation industry "will do about $2 billion-plus annual revenue in 2015, and we're forecasted to grow five-fold in the next 10 years."

The impact could be felt across the board. A 2013 paper by two Oxford University researchers argued that up to 47 percent of American jobs could be considered "high risk" to be subsumed by automation over the next "decade or two." The most-threatened occupations list ranges from routine-based tasks such as telemarketing and sewing to algorithm-solvable things such as tax preparers, data entry keyers, and insurance underwriters.

Experts insist that robots don't shrink payrolls so much as change them.

Research published earlier this year by the think tank Third Way found no direct link between companies who put industrial robots into service and the number of manufacturing jobs lost. For example, the United States lost 33 percent of its factory jobs between 1992 and 2012, but Germany lost only 19 percent—despite deploying more than three times as many industrial robots per hour of production.

Researchers did note a link, however, between robots and the makeup of manufacturing workforces. A *Harvard Business Review* article described the data as suggesting "that the arrival of robots tended to increase the employment and pay of skilled workers even as it seemed to 'crowd out' employment of low-skill, and to a lesser

extent, middle-skill workers. So while robots don't seem to be causing net job losses, they do seem to change the sort of workers that are in demand."

Burton Mills agrees with the reasoning.

"If you used to have a skilled person, such as a welder, and now you have a machine doing the welding, then that employee [running that particular portion of the line] turns into a parts handler or a loader. That person can be paid less than what they used to, because there's less skill involved than there used to be," Mills said. However, "there's also a lot more opportunity on the skilled end than there used to be. There will be a need for that higher-skilled guy to keep the machines running."

For growing companies, the shifts can be powerful.

Polo Custom Products manufactures a wide variety of items, including special circular sponges used by the U.S. military to patch battlefield wounds. Production involves cutting disks out of the sponges, then affixing them to gauze and placing them on a strip. Following some extensive work with CIRAS, the company hopes through a low level of automation to increase production, reduce tedium-induced mistakes, and lower personnel costs (for this product) by replacing five employees with one.

"We're in a growth phase here, and we're trying to grow," said Eagleburger, a plant engineer. "Bodies are limited right now. Anything we can do to free up bodies to do other things is good."

Bruce Tamisiea, president of Tecton Industries, Inc. in Spencer, Iowa, said his company has never had a problem finding workers. Founded in 1981, Tecton makes precision machine component parts, including hydraulic valves, spools, and metrology devices, as well as parts for weapon and robotic manufacturers. Tecton's goal has always been to help employees "work smarter, not harder," he said.

"Our team has been very innovative utilizing several types of automation, from robotics to the use of 3D printers," Tamisiea said. "Much of what we produce goes outside the country, so we're competing with people around the world often. Automation provides us another method for improving our quality and productivity in a consistent, cyclical way."

At Curries, improvement has meant responding to shifting customer needs in a door industry that no longer is based on large orders from distributors. Retailers no longer keep large amounts of stock on hand, Bill said, choosing instead to have customers special order doors with various individual modifications.

The shift means Curries' production line at times can see a great deal of disparity from one door to the next. Human workers therefore will always be crucial (and frequently be in demand) in that part of the plant.

"We will never be a LEGO factory where there's two people running the entire facility," Bill said. "Instead, we'll just continue to identify and implement opportunities to minimize labor costs."

"For now, we're compensating for the labor shortage," Bill said. "But we can't slow down our efforts. If anything, we have to accelerate."

"We're in a growth phase here, and we're trying to grow. Bodies are limited right now. Anything we can do to free up bodies to do other things is good."
— *Ken Eagleburger*

CIRAS Works with Companies to Make Smart Automation Shoppers

CIRAS has spent the past year, with the help of an Iowa State University engineering professor, working to upgrade its ability to talk to companies about automation.

A CIRAS presentation walks through multiple ways to evaluate automation: How do you calculate the return on investment? How much labor will you save by installing new machines? Will you save in reduced training or employee injury costs? What will the freed-up labor allow you to do? Are the new machines flexible enough to provide benefit beyond a single product?

The goal, said Chris Hill, head of CIRAS' Technology Assistance Program, is to make manufacturers smart shoppers before they sit down to work with the companies that provide automation equipment.

It's important for companies to think through all the implications of new machines, Hill said. If product requirements call for a production area to be cleaned frequently, then you have to mention that to the people who make the machines—otherwise, they may design it in such a way that you have no access.

"I compare it to buying a car," Hill said. "If you just go in and say you want a car, you may get whatever they want to sell you. But if you say, 'I want something with good gas mileage, maybe a certain size of engine,' then you're driving the conversation, and they'll do a better job of meeting your needs."

For more information, contact Chris Hill at 515-294-5416 or chhill@iastate.edu.

Capital Investment Trending Up in Manufacturing

by Liesl Eathington

Emerging automation technologies hold promise for improving efficiencies all along the manufacturing process—from material handling, storage, and fabrication to inspection, data capture, and beyond. The topic of automation is especially relevant in Iowa, where industries are seeking to increase productivity while contending with constrained labor force growth.

Absent reliable data directly from firms, we can only guess at the pace and pervasiveness of current automation trends across the United States. Statistics from the U.S. Census Bureau include limited data on asset values and expenditures, offering a glimpse into broad capital spending by sector and state. To some extent, we might infer current automation trends from those broader capital investment patterns.

Iowa's ratio of capital asset values per worker tends to be lower than the U.S. average, suggesting that its manufacturing sector requires somewhat more labor-intensive production processes. The state's mix of manufacturing industries at least partially explains its low capital-to-labor ratio. Fabricated metal, machinery, and food manufacturing firms, of which Iowa has many, tend to be less capital intensive than paper, tobacco, chemical, and petroleum-related manufacturing firms, of which Iowa has few.

Even considering differences in their capital intensity, industries or regions that are aggressively automating their production systems should have higher rates of new spending on capital relative to expenditures for production labor. Economists refer to growth in the amount of capital per worker as "capital deepening."

Measures of capital deepening include changes in the ratio of capital stock per production worker and capital spending per production labor hour. Recent trends in both of these measures suggest shifts by Iowa manufacturers toward greater capital investment. **For example, Iowa ranked 21st among states in its ratio of capital assets per production worker in 2012, up from a ranking of 31st in 2002.**

Figure 1 illustrates recent trends in real capital spending relative to total production worker hours. Data for Iowa and the United States have been indexed to base year values in 2002, and dollar values for capital purchases (new and replacement purchases of buildings, machinery, and equipment) were adjusted for inflation.

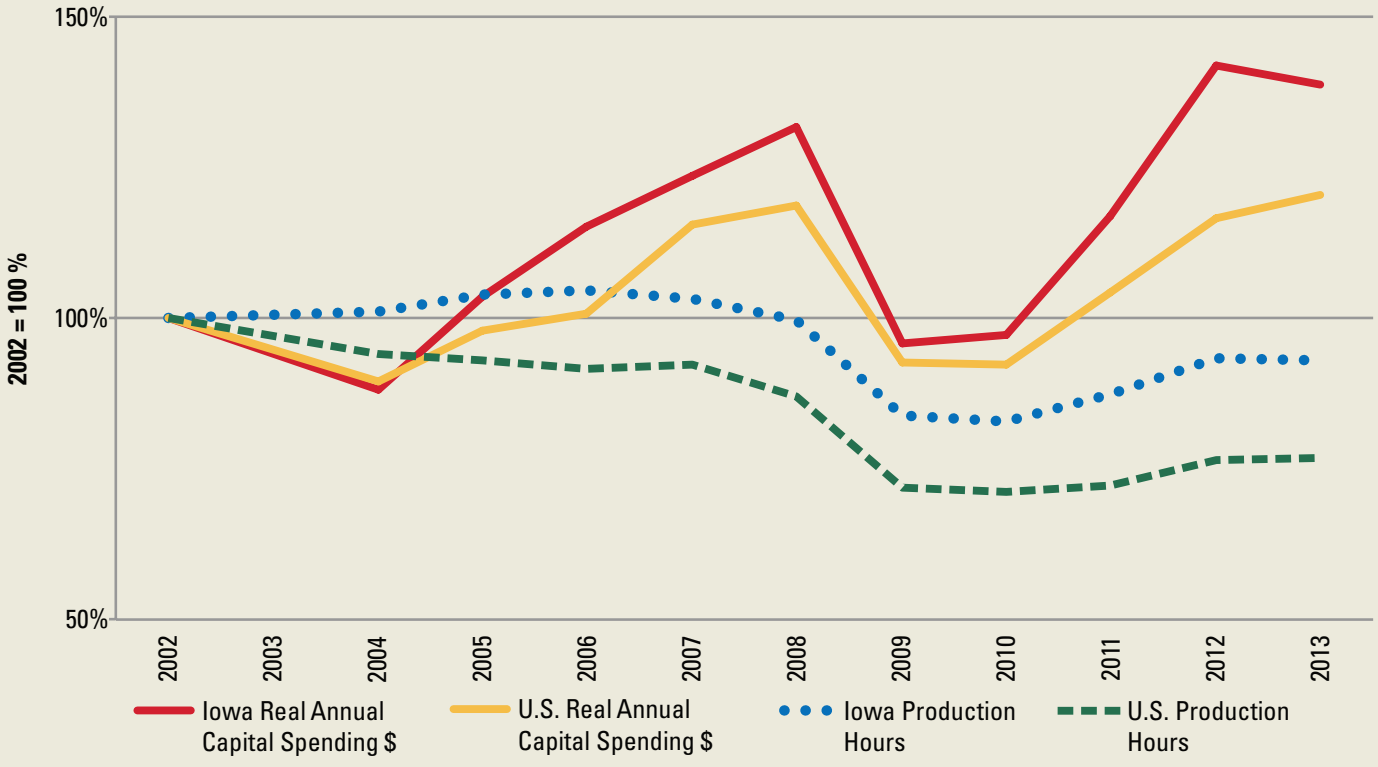


Figure 1. Real Change in Annual Capital Expenditures and Production Hours, 2007–2012.

Real capital spending in Iowa and the United States has been outpacing growth in production worker hours since 2005. The 2007–2009 recession saw sharp declines in both measures of activity; however, capital expenditures recovered to prerecession levels by 2012. Production worker hours in Iowa and the United States remain below prerecession levels. Capital spending in Iowa has generally grown faster than national averages, both before and after the recession.

Figure 2 illustrates on a state-by-state basis the real change in average capital expenditures per production worker before and after the recession. On a per worker basis, U.S. manufacturing firms reported about $3,600 more on capital purchases in 2012 than in 2007. Several states experienced real declines in average annual capital spending per production worker. Iowa grew slightly faster than the national average rate.

Data suggest that Iowa has recently experienced a period of capital deepening, possibly indicating a greater willingness by manufacturers to invest in automation technologies at the expense of expanding their payrolls.

Manufacturers must regularly weigh the trade-offs between investing in capital and labor considering the availability, costs, and risks of both. Data suggest that Iowa has recently experienced a period of capital deepening, possibly indicating a greater willingness by manufacturers to invest in automation technologies at the expense of expanding their payrolls.

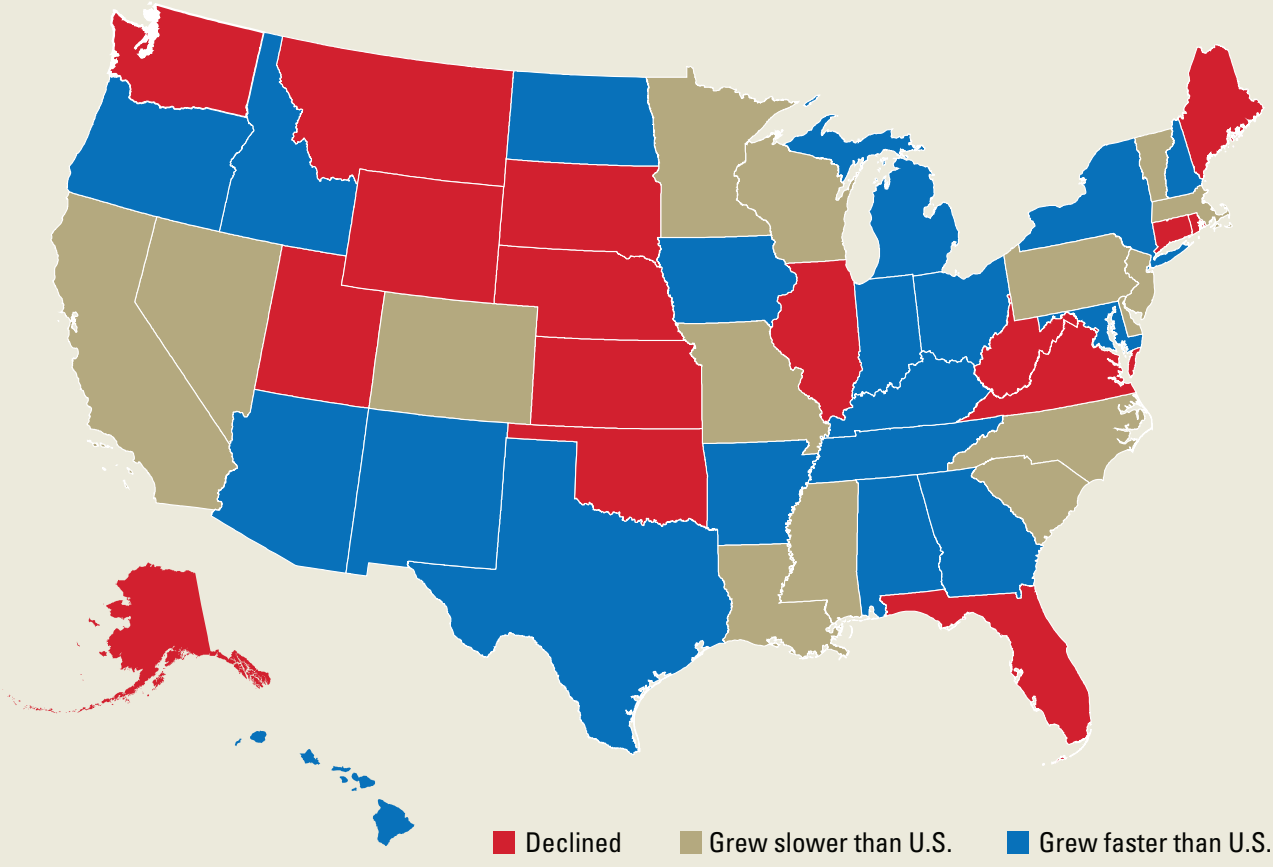


Figure 2: Value of Capital Stock per Production Worker in the Manufacturing Sector (2012).

Tell Us What You Can Do

A capability statement is a necessity to succeed in government contracting. A good one includes the following information:

Title Heading—Include your company name, logo, and contact information with a specific person's name, phone, and e-mail.

Core Competencies—Craft a short introduction statement relating your company's core abilities to the government agency's specific needs. Follow it up with keyword-heavy bullet points:

- Use short sentences; no long paragraphs.
- Keep it short; preferably one side of one page.
- Create a new statement for each agency, prime, or teaming opportunity.

Past Performance—List past customers for whom you have done similar work. Prioritize by related agency, then all federal, then other government, and lastly commercial contracts. If a past project doesn't relate to the targeted government agency's needs, don't list it.

Differentiators—Identify what makes your business different from competitors and how that would benefit the targeted agency.

Company Data—Give a very brief company description detailing company size, years in business, special accreditations, etc.

List Specific Pertinent Codes and Data

- DUNS, CAGE, and NAICS codes
- Socioeconomic certifications, such as 8(a), HUB Zone, SDVOB, WOSB
- Whether or not you accept credit and purchase cards

Close the statement at the very bottom of the page with your logo, address, phone numbers (voice, mobile, and fax), e-mail, and website.

CIRAS' Procurement Technical Assistance Program (PTAP) can assist you with this or any other government contracting issue. Contact Andy Alexander at andyalex@iastate.edu or 402-547-0333. Or join our LinkedIn group at http//linkd.in1ICgNWF.

CIRAS Helps Iowa Small Business Land More Than $329,000 in Government Contracts

From the beginning, when Jeanie Waters launched 3rd Degree Screening in Council Bluffs in 2012, she knew that its success would require both commercial and government contracts. Waters, whose company provides background checks, drug tests, and field investigation services for clients worldwide, turned to CIRAS for help with the government part.

Jeanie Waters

"The overall value [of CIRAS] is in learning the process and having educated support throughout," Waters said. "You keep building on what you know and you build off your CIRAS representative."

Waters' business landed its first government contract within eight months of submitting its first proposal. As of today, government business has totaled more than $329,000. One of those contracts is set to double in the next month, and another contract has been extended.

Waters believes her company's government contracting success partly stems from the tools and advice CIRAS provided regarding the company's capability statement. CIRAS critiqued the company's original draft and shared tips about what contracting officers are looking for in vendors.

> "The overall value [of CIRAS] is in learning the process and having educated support throughout. You keep building on what you know and you build off your CIRAS representative."
>
> — *Jeanie Waters*

CIRAS provided a template to create a cleaner and more professional-looking presentation of the business and helped Waters identify what information should be included, such as a company description, bullet points of key differentiators, geographic coverage of services offered, and affiliations.

"I follow the flow of the original layout, tweaking the capabilities statement and responses to fit each proposal," Waters said. This allows her to focus on key aspects "rather than getting overwhelmed with all the details."

CIRAS also helped Waters realize that her business—although growing steadily—qualified for the State of Iowa's Targeted Small Business (TSB) certification as a woman-owned business. Waters has secured this state certification and has received her federal certification from the SBA as an economically disadvantaged woman owned small business, which will open even more government contracting opportunities for her company.

"What CIRAS teaches isn't just for government work," Waters said. "You can cross over what you learn to the commercial side, too. I have seen the process come to fruition."

For more information, e-mail Andy Alexander at andyalex@iastate.edu or 402-547-0333.

Getting to Know Iowa's Utilities Sector *by Liesl Eathington*

The utilities sector operates outside the limelight in Iowa's economy, seldom receiving the kind of attention paid to agriculture, manufacturing, and insurance. Following is a brief snapshot.

How big is Iowa's utilities sector?

Not large, considering its direct operations only. Measured by gross domestic product (GDP), which includes payments to workers and returns to owners and investors, utilities represent less than 2 percent of Iowa's economy. Direct employment in utilities accounts for less than 1 percent of all jobs in the state, and the sector contains fewer than 1 percent of private Iowa businesses.

	Utilities Sector	Percentage of Iowa Total
2014 GDP	$2.99 billion	1.8 %
Wage and salary jobs in 2013	8,100	0.5 %
Public sector	1,650	
Private sector	6,450	
Establishments (private only) in 2014	340	0.4 %

What industries and activities are included within the utilities sector?

These firms provide electric power generation, transmission, and distribution; natural gas distribution; steam supply and distribution; and water treatment and distribution including irrigation; and sewage collection, treatment, and disposal services. Telecommunications companies are not included, nor are companies that mine, produce, or engage in pipeline transportation of petroleum or biofuels products.

Electric power plants account for the largest number of utilities establishments in Iowa, followed by water supply and sewage treatment providers.

Electric power plants account for the largest number of utility establishments in Iowa, followed by water supply and sewage treatment providers.

What about competition in the utilities sector?

Iowa has a comparatively high proportion of private versus public sector utilities jobs. About 80 percent of Iowa's utilities jobs are in private firms, compared to 68 percent in the United States as a whole.

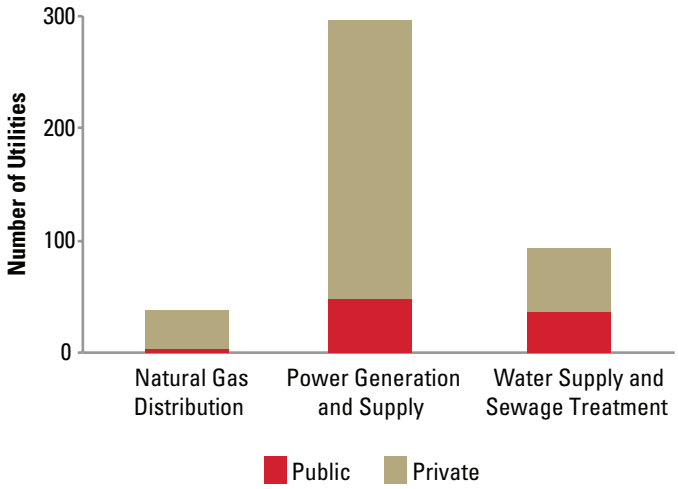


Figure 1: Distribution of Iowa's Utilities Establishments

The Iowa Utilities Board (IUB) regulates the rates and services of investor-owned companies that provide electricity, natural gas, and water services in Iowa. Municipal electric utilities, rural electric cooperatives, and municipal natural gas providers are also subject to varying levels of rate and service regulation by the IUB.

Nationwide, about 24 percent of wage and salary workers in the utilities sector are represented by unions. In contrast, unions represent only 10.5 percent of manufacturing sector wage and salary workers.

Who works in Iowa's utilities sector?

Workers who install or repair electrical power lines are the largest occupational group, with about 15 percent of the jobs. Power plant operators are the second largest group with 11 percent, followed by customer service representatives with 4 percent.

The average annual wage for Iowa utilities workers was $61,000, well above the all-sector average of $41,000. Engineering-related utilities jobs pay 9 percent more than average for engineering jobs in Iowa. Installation and repair occupations in utilities exceed their occupation group's average pay by 40 percent.

As this profile shows, despite its small number of establishments and employees, the utilities sector in Iowa pays outsized wages and provides vital inputs to all other sectors of the state's economy.

CIRAS' Metal Additive Manufacturing Machine on Campus Being Prepped for Early 2016 Debut

Iowa industry leaders should be able to launch test projects early next year with a new metal 3-D printer that CIRAS has obtained to educate manufacturers about the enormous, groundbreaking possibilities of additive manufacturing technology.

The machine, known as a direct metal sintering system, was paid for using a combination of $900,000 obtained from CIRAS, the U.S. Department of Commerce's NIST Manufacturing Extension Partnership, Iowa State University's College of Engineering, and the Iowa Economic Development Authority. It arrived on the Iowa State campus in late September and is being housed in a newly remodeled room in Sukup Hall. Training is ongoing for campus faculty and staff and will be completed before the end of the year.

A public unveiling will be scheduled at a later date.

Chris Hill, who oversees CIRAS' Technology Assistance Program, said he hopes to begin using the machine for projects with Iowa companies sometime early in 2016. CIRAS intends to use it mostly for educating industry, Hill said, but time also will be made for faculty members to perform research and to expose students to the technology.

The research may target company-specific problems or simply be orchestrated to determine the best industrial uses for additive technology. Such machines open a broad range of possibilities for new designs, Hill said— parts can now be much lighter or use unusual geometry, for example— but more research is needed to determine the best possible production techniques.

> "We're going to work hard to create knowledge and communicate that knowledge to industry. The advantages and limitations of any technology are what you'd like to understand. You need to know both."
>
> —*Chris Hill*

"We're going to work hard to create knowledge and communicate that knowledge to industry," Hill said. "The advantages and limitations of any technology are what you'd like to understand. You need to know both."

Direct metal sintering machines use the combination of a laser and powdered metal to create metal parts or tools one tiny layer at a time according to a computerized design. Plastics-based machines, the most commonly discussed form of 3-D printing, have been used for years as an industry shortcut to producing prototype products. But metal-based technology currently is rare in Iowa.

CIRAS experts believe metal additive manufacturing technology has the potential to revolutionize how Iowa businesses make parts and tooling. (The new machine, one of the largest available, will be able to build anything that fits in a space 250mm by 250mm by 300mm, or slightly smaller than 10 inches by 10 inches by 12 inches.) In addition to learning new methods of design and new ways to manufacture, the technology will allow companies to cut costs and reduce the time needed to bring new products to market.

For more information about CIRAS' assistance with additive manufacturing, contact Chris Hill at chhill@iastate.edu or 515-294-5416.

CIRAS Planning March Innovation Summit for Metal Fabricators

Planning is now under way for CIRAS' next campaign to focus its industrial and economic expertise on projects for the benefit of a large Iowa manufacturing subsector.

A total of 102 people from 55 organizations took part in two previous Innovations Summits arranged by CIRAS in spring 2014 and spring 2015 under a five-year effort funded by the United States Economic Development Administration's University Center Program. The events, focused on bringing new technologies to businesses in the plastics and machinery manufacturing sectors, spawned upgrades and innovations that led to $1.5 million in new or retained sales for the participating companies and more than $184,000 in various cost savings to date.

Next, on March 22, CIRAS will focus on Iowa's fabricated metals sector—a group that includes the makers of cutlery, hand tools, boilers, springs, and wire, among other products.

"Metal fabrication can be hard, physical work, and these companies deliver quality products that feed almost all manufacturing sectors in the state and the country," said CIRAS program director Pete Nadolny. "Further, these firms are in mature, competitive industries, where customers are always pushing for more, but often willing to pay less.

"Metal fabrication is hard, physical work, and these companies deliver quality products that feed almost all manufacturing sectors in the state and the country."
— *Pete Nadolny*

"CIRAS' services can help these firms use new technologies and processes to improve their profits," Nadolny said. "This, in turn, will not only help the firms, but also improve the quality of life in the communities they support."

Metals fabrication—the shaping or joining of metal pieces using processes such as forging, stamping, bending, machining, welding, or assembling—added $1.7 billion to Iowa's gross domestic product in 2013, or roughly 5.5 percent of all the manufacturing in the state.

Iowa has more than 1,000 businesses in this sector, although roughly 400 have no employees. The 20,600 wage and salaried employees who do work in the sector (as of 2014) earned an average of $48,600 annually, making it the third largest manufacturing industry in Iowa behind food and machinery manufacturing.

Look closer at Iowa's rolling landscape and you may be surprised to discover what is made here—everything from refuse trucks and powered machinery to buckets and pastries. When you buy products manufactured in Iowa, more money stays in our local communities.

Brownells, Inc.

Overview: Brownells is among the world's largest suppliers of firearm parts, accessories, ammunition, and gunsmithing tools. Its business is primarily conducted through its website and catalogs; however, the company will debut its first-ever retail location in Grinnell, Iowa, in early 2016. In addition to its direct-to-customer business, Brownells designs gunsmithing-related tools, compounds, and firearm-related parts under its own brand.

Location: Montezuma and Grinnell, Iowa
Founded: 1939
Employees: 400+
Website: www.brownells.com

Paragon International, Inc.

Overview: Paragon has earned a world-class reputation for producing high-quality concession products, including commercial-quality popcorn machines available for home use. An Iowa business for parts of five decades, the company remains family owned (David and Glenda Swegle) and has produced its own machines for consumers since 1995.

Location: Nevada, Iowa
Founded: In 1979, when John Goodlaxen purchased a Minneapolis business and moved it to Iowa; bought by the current owners in 1992; adopted the Paragon name in 1999.
Employees: About 45
Website: www.manufacturedfun.com

Smitty Bee Honey, Inc.

Overview: Smitty Bee provides bulk honey products for food service professionals, food/beverage producers, and retailers looking for a private-label honey. The company offers a wide range of packaging options for both individual and commercial use.

Location: Defiance, Iowa
Founded: 1988
Employees: 23
Website: www.smittybeehoney.com

UPCOMING EVENTS

- **Learn Before You Leap: Business Considerations for GovCon**
  November 17, 2015
  9:00 a.m. to 10:00 a.m.
  Dubuque

- **GovCon 101: R3 Refreshers, Reminders, and Re-Dos**
  November 24, 2015
  8:30 a.m. to 9:30 a.m.
  Webinar

- **ExporTech Workshop—Session 1**
  January 12, 2016
  8:00 a.m. to 5:00 p.m.
  West Des Moines

For more information on these and other similar events, please visit www.ciras.iastate.edu/events.asp.

For the Record

The cornerstones of CIRAS' support structure were renewed by separate government agencies this summer in moves that mean CIRAS will continue to maintain access to its vast network of expertise. The U.S. Defense Logistics Agency in July renewed CIRAS as Iowa's local Procurement Technical Assistance Center. CIRAS will receive $600,000 during fiscal 2016. The money will be matched with CIRAS funds to provide $1.2 million of assistance to Iowa businesses in navigating the world of government contracting.

At the same time, the National Institute of Standards and Technology (NIST) reaffirmed CIRAS as the Iowa affiliate of NIST's Manufacturing Extension Partnership. The $2.1 million award will be combined with additional funds to create a program budget of $6.3 million.

The Economic Development Administration also renewed CIRAS' funding for its Iowa "University Center Economic Development Program." The $250,000 award will be combined with matching CIRAS funds to create a program budget of $500,000.

STAFF NEWS

CIRAS Associate Director JoAnn Miller retired September 2015

JoAnn V. Miller, CIRAS Associate Director, is retiring after 10 years of serving Iowa business and industry.

Since 2005, Miller has been instrumental in the transformation and growth of CIRAS. Her departure now frees her up to place more of her focus on the transformation and growth of multiple grandchildren.

JoAnn Miller graduated from the University of Northern Iowa with an accounting degree in 1973.

She spent her first stint at Iowa State University working in Extension and Outreach, Conference Planning and Management. She joined CIRAS in February 2005, when CIRAS Director Ron Cox recognized her expertise and hired her to run CIRAS's finances.

Miller led numerous strategic initiatives and continuous improvement activities during her tenure at CIRAS, including operationalizing the CIRAS strategic plan, developing a comprehensive risk assessment, expanding CIRAS' computer infrastructure, and keeping CIRAS in compliance with federal regulations. She also oversaw a retooling of the website and publication of *CIRAS News*.

Miller's retirement certificate, issued earlier this year, read simply that "JoAnn lives CIRAS values every day. Her knowledge of Federal regulations is best in class. She delivers what the customer needs, and has backup material prepared in advance… just in case it is needed. Her integrity is unmatched, and known and respected across campus. She is constantly asking 'What if?'. She has gone beyond the call of duty to create a high-performing Operations Team, to push the CIRAS Leadership Team to new limits, and to pull all of CIRAS together. And she has done all of this because she truly cares about CIRAS, Iowa industry, the ISU community, and every single CIRAS staff person."

Miller will be missed.

CONTACT INFORMATION

ciras Engage. Educate. Embed.

Since 1963, we have delivered proven services to enhance the performance of industry. Our approach—Engage. Educate. Embed.—creates specific solutions that allow each business and its community to prosper and grow. Coupled with a satisfaction guarantee, our typical client has achieved a 200% ROI. Clients have reported an economic impact of more than $2 billion over the past five years.

				Account Manager	Economic Development	Engineering	Government Contracting	Innovation	Management Practices	Productivity	Quality Management	Safety	Supply Chain Management	Sustainability	CIRAS Operations
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Bangalore, Savitha	515-294-5240	savitha@iastate.edu	Campus												●
Barton, Leah	515-291-0733	bartonl@iastate.edu	Waterloo												●
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Eckhoff, Jeff	515-231-7826	eckhoffj@iastate.edu	Campus												●
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Willett, Michael	319-234-6811	mwillett@iastate.edu	Waterloo							●					
Zimmerman, Mary	515-450-1278	maryz@iastate.edu	Campus				●								

CIRAS PARTNERS

Iowa State University

- Center for Crops Utilization Research
- Center for Nondestructive Evaluation
- College of Engineering
- Community and Economic Development
- Department of Environmental Health and Safety
- Engineering Career Services
- Engineering-LAS Online Learning
- Extension and Outreach
- Industrial Assessment Center
- Meat Science Extension

- Des Moines Area Community College
- Iowa Area Development Group
- Iowa Association of Business and Industry
- Iowa Business Council
- Iowa Central Community College
- Iowa Farm Bureau
- Iowa Innovation Corporation
- Iowa Lean Consortium
- Iowa Sustainable Business Forum
- North Iowa Area Community College
- Northeast Iowa Community College
- Quad Cities Manufacturing Innovation Hub

IOWA STATE UNIVERSITY
Office of Economic Development and Industry Relations
College of Engineering

Center for Industrial Research and Service
Extension 4-H Building
Ames, Iowa 50011-3632

THE INNOVATION CYCLE

It's Not Innovative If It's Not Safe

by Jim Poe

Safety plays a key part within the Innovation Cycle because a product, service, or process developed without an eye on safety can spark significant issues. Consider the following:

- Injuries cost U.S. manufacturers about $188.9 billion each year.
- The average cost of one loss-of-time accident is about $36,550.
- United States manufacturing averages 2,000 eye injuries every day.
- On average, 40 percent of all new hires will have an on-the-job accident within their first 12 months of working.

Some things to consider as you walk through your factory:

Slips/Trips/Falls—This is the largest issue for manufacturers regarding any type of injury, at a price tag of about $13.3 billion annually. The category includes incidents involving things such as brooms, mops, sheets of wood, wood posts, and sheets of metal.

Hazard Communications—This area represents the second highest number of violations written by OSHA this past year. Companies need to train their people on both Material Safety Data Sheets (MSDS) and the newer Safety Data Sheets (SDS).

Lock-out, Tag-out Procedures—This was the sixth largest number of violations written by OSHA last year. Companies know this is required but may not know how to write the procedures, who should be trained, or what information should be posted. The goal is to ensure that all sources of energy (electrical, air, gas, gravity, water, etc.) are verifiably locked out before working on equipment.

Fire Extinguishers—They should be inspected monthly by a trained internal person and yearly by an outside, authorized company. Document it with cards attached to the extinguishers.

Machine Guarding—Proper guarding is required regardless of the age of the equipment, even on older lathes, saws, and spindle drill presses.

CIRAS can help companies understand safety regulations either in terms of overall compliance or with a specific issue. One key is to have a company's safety team involved with the evaluation, writing, and implementation of any safety program.

For more information, contact Jim Poe at 515-294-1507 or jrpoe@iastate.edu.

To participate in the innovation discussion, join our LinkedIn group at linkd.in/12tVLy1.